

Claims

1. Apparatus for measuring the oxygen saturation level of blood at an internal measurement site in a human or animal patient by reflectance pulse oximetry, comprising:
 - a first light source having a first spectral distribution;
 - a second light source having a second spectral distribution;
 - a first optical fibre having a proximal end adjacent at least one said light source, and a distal end adapted in use to be positioned adjacent said internal measurement site, for transferring light from at least one said light source to the internal measurement site;
 - at least one receiver, for receiving light from the first and second light sources;
 - at least a second optical fibre having a proximal end adjacent the said receiver, and a distal end adapted in use to be positioned adjacent said internal measurement site, for transferring light reflected from the region of the measurement site to the receiver;
 - means for determining the oxygen saturation level of the blood at the internal measurement site, based on the light produced by the light sources and light received by the receiver,wherein the optical centres of the first and second optical fibres are separated from one another by at least 1 mm at their distal ends.
2. Apparatus as claimed in claim 1, wherein the first light source is monochromatic.
3. Apparatus as claimed in claim 1 or claim 2, wherein the second light source is monochromatic.
4. Apparatus as claimed in any one of claims 1 to 3, including means for pulsing light from the first and second light sources sequentially along the first optical fibre.
5. Apparatus as claimed in any one of the preceding claims, wherein the first light source is such as to produce light having a peak emission wavelength of from

630 nm to 760 nm and the second light source is such as to produce light having a peak emission wavelength of from 820 nm to 930 nm.

6. Apparatus as claimed in any one of the preceding claims, wherein the said measurement site is the surface of the brain, and wherein the apparatus additionally comprises a cranial access bolt for insertion into the skull of the patient, and means for supporting the said optical fibres in the access bolt, such that light from the said light sources is directed towards the surface of the brain, thereby enabling measurement of the oxygen saturation level of blood at the brain surface.

7. Apparatus as claimed in claim 6, wherein the cranial access bolt is adapted to support the said optical fibres, such that the distal ends of the optical are positioned from 0 to 4.0 mm from the surface of the brain.

8. A method of measuring the oxygen saturation level in the brain tissue of a human or animal patient, comprising the steps of inserting the distal ends of the optical fibres of apparatus as claimed in any one of claims 1 to 5 through a cranial access bolt positioned in the skull of the patient;
positioning the distal ends of the optical fibres at a distance of from 0 to 4.0 mm from the brain surface;
illuminating the brain surface of the patient using the said light sources;
and determining the oxygen saturation level of blood at the brain surface from reflected light received at the receiver via the said second optical fibre.